RECLAMATION

Managing Water in the West

Technical Report for Upper Snake River Biological Opinion # 1009.2700

Distribution and Abundance of Bull Trout (*Salvelinus confluentus*) in the Middle Fork Boise River Basin, Idaho

Summary Report 2004

U.S. Department of the Interior
Bureau of Reclamation

September 2004

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DISTRIBUTION AND ABUNDANCE OF BULL TROUT (*Salvelinus confluentus)* IN THE MIDDLE FORK BOISE RIVER BASIN, IDAHO

Abstract

Boise National Forest and USBR survey teams collected 338 individual fish representing 3 species in the Boise River surveys. Fourteen bull trout were captured, and were tagged with 125 kHz PIT tags. Habitat surveys were conducted on 11 of the 13 stream sites sampled. One stream sampled had no fish and bull trout were found in one of the four streams sampled that did have fish. Habitat degradation appears to have caused the extirpation and reduction of populations of bull trout in the sites surveyed. Fisheries and habitat data will be entered into the Boise National Forest fisheries data base used for stream assessments.

Introduction

With growing concerns surrounding fisheries in the Northwest, the status of many native salmonid fishes such as bull trout (*Salvelinus confluentus)* have become a focus of interest. The Columbia and the Klamath River Basin populations of bull trout were listed as threatened under the Endangered Species Act in June 1998 and the final rule was published in the Federal Register (USFWS 1998). Reasons for declining bull trout populations included habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, poor past management practices, and the introduction of non-native competitors such as brook trout *Salvelinus fontinalis*.

In response to the federal listing, the U.S. Forest Service (USFS) and the U.S. Bureau of Reclamation (USBR) initiated a three-year cooperative study to investigate the factors affecting the distribution of bull trout in the Middle Fork Boise River basin. The study began in July 2001 and continued through August 2003. The purpose of the work was to assess habitat, water temperature, and flow conditions as they relate to bull trout presence or absence, abundance, movement, and age-class distribution on a large-watershed scale. In this three-year cooperative study, Black Warrior Creek and the Queens River were found to have the highest densities and best production of bull trout of the tributaries surveyed to the Middle Fork Boise River.

In July 2003 a large wildfire (Hot Creek Fire) burned through tributary basins of the Middle Fork Boise River. Heavy rain in August 2003 resulted in bed scouring and hydroclastic debris flows in Steel, Lake and Bear Creeks. The debris flows washed into the Middle Fork Boise River scouring out the road bed of Forest Road 268 in sections between Black Warrior Creek and Queens River. Despite these occurrences, bull trout were found during electrofishing surveys of Bald Mountain Creek in late August 2003. In 2004, a cooperative effort with USBR and Boise National Forest began to survey fish communities in streams affected by the Hot Creek fire. The study was designed to meet the following objectives:

1. Assess post-fire fish presence/colonization of Middle Fork tributaries.
2. Determine the status of the Black Warrior Creek bull trout population after wildfire and flooding in the lower sections of this tributary.

Study Area

The Boise River basin, located in southwestern Idaho, is a major tributary to the Snake River. The upper Boise River basin covers 5,700 km² of the granitic rock-dominated landscape with elevations ranging from 931 m to 3,231 m elevation. The upper Boise River includes three sub-basins: the North, Middle, and South Forks of the Boise River. The work discussed in this report occurred in the Middle Fork Boise River that joins the North Fork Boise River 30 km upstream from the South Fork/ Middle Fork Boise River confluence (Figure 1). The Middle Fork Boise River extends to 2,740 m elevation. The Boise River system is fed primarily by snowmelt run-off with highest flows occurring May-June and lowest flows in September-October. Flows range from 5.06 m^3/s to over 198.28 m^3/s in the mainstem Boise River below the confluence of the North and Middle Fork Boise Rivers. The Middle Fork Boise River flow ranges from 4.04 m^3/s to 119 m^3/s. Land uses in the Middle Fork watershed include grazing, mining, recreation, and both commercial and private timber harvest. The majority of the Boise River basin lies within Forest Service or Wilderness area boundaries.

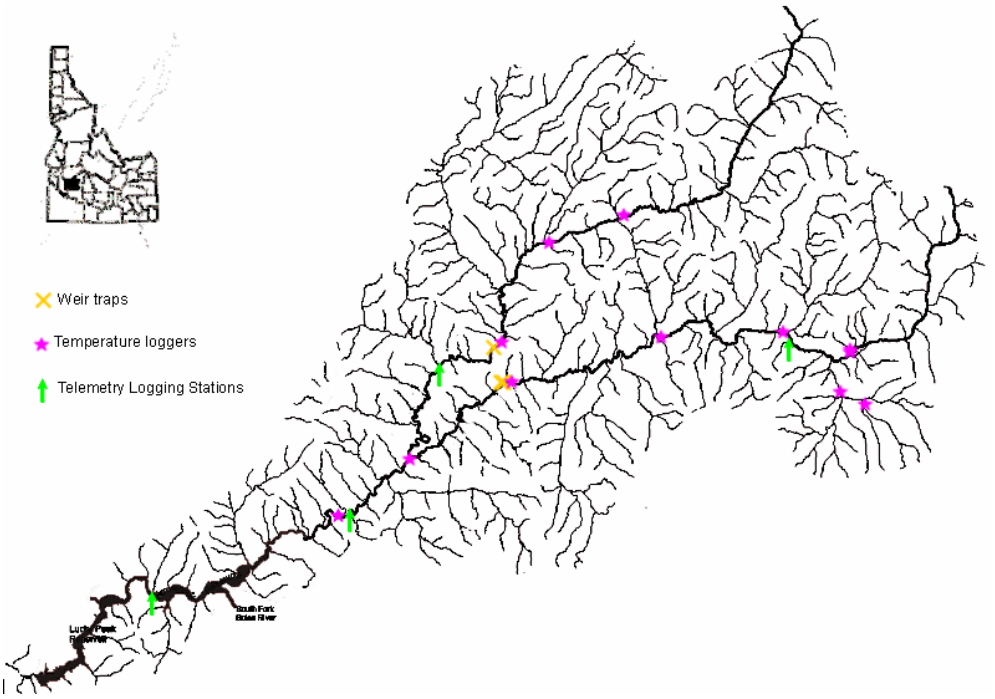

Figure 1. Boise River watershed showing Arrowrock and Lucky Peak Reservoirs, temperature, trapping and telemetry logger locations. (X = Weir Traps, ✱ = Temperature loggers, and ⬆ = telemetry logging stations.)

Methods

Fish Data Collection

Stream reaches were sampled by electrofishing using two different methods. Stream sampling was conducted to calculate density estimates and collect habitat data. For these streams, Two-pass backpack electrofishing was performed. In areas where riparian canopy or debris made stream access difficult single pass or select habitat units were sampled where access was possible. Smith-Root™ battery-operated electrofishers were used; batteries were changed every 3,500 to 4,000 operating seconds. Electrofishers were set between 500 and 900 volts and 30 to 40 Hz, depending on stream size and conductivity. Due to equipment availability limitations we were unable to measure conductivity of Boise River streams in 2004. During habitat surveys in 1999-2003 the Middle Fork Boise River and its tributaries have low conductivity, which averaged 53 µS (range: 48 µS - 84 µS).

All captured fish were identified to species and enumerated. Total length (TL) was recorded for all species. All amphibians were counted and released, though stage of development was not noted. Scale samples and fin clips were taken from all bull trout captured to be used for aging and genetic analysis.

Habitat Data Collection: 2-pass density sites

Habitat condition was measured following modified R1/R4 methods of the USFS as described in Burton (1999). Each stream site was located with a Garmin™ GPS 76, and UTM coordinates were recorded. Habitat was measured using the following methodology: waters were first categorized by the observer as slow or fast based on USFS training (Burton 1999). Different measurements are taken for either slow or fast water. A two-meter stadia rod marked in tenth meter units was used to measure all habitat variables. Field staff was trained each year for habitat measurement under guidance of the USFS.

Parameters collected for slow water habitats were: thalweg lengths, maximum depth, mean depth, crest depth, averaged wetted width, available cover area, and percent fines in pool tails. Parameters collected for fast water habitats were: thalweg length, mean depth and wetted width.

Definition of Habitat Parameters Collected

Thalweg Length: thalweg length was the measured distance in the path of a stream that followed the deepest part of the channel from the crest of the slow water unit to the formative feature of the habitat unit (Armantrout 1998).

Crest depth: crest depth is the downstream point of transition of slow water habitat types. It is the shallow downstream end of the depression in scour pools and the point of greatest flow over a dam.

Maximum Depth: maximum depth was the greatest depth measured in the slow water type.

Mean Depth: mean depth was taken at the area where average width was measured.

*Depths were measured at approximately ¼, ½, and ¾ of the channel width and the average was calculated by dividing the sum by four (to account for zero depth at the banks).

Average Width: average width was the wetted width measured at location of the pool that was the mean depth calculated from the depth at the crest and maximum depth of the pool.

Available Cover Area: cover was categorized as large wood debris, overhanging vegetation, or undercut banks. All cover types had to be at least 0.30 m in width to be measured and capable of providing refuge to fish. All aggregates of wood were measured for combined total area (each piece was added to calculate a combined total). Each habitat feature was measured by length and width and area was calculated. The area of cover is reported in square meters (m^2).

Grid Fines: percent fines were estimated at each slow water pool tail. Fines were measured using a 100-intersection grid. Field staff measured the percent of the wetted substrate area of pool tail that is made up of fine particles, defined as sand/silt less that 6 mm, by randomly tossing the grid. The cross section of the pool tail was subdivided into 3 segments: right, middle, and left. The grid intersections were counted only where substrate was smaller than 6 mm.

Elevation: site locations were mapped using UTM coordinates collected with a Garmin GPS 76 unit at each site. Waypoint locations were mapped and elevation (m) was taken from coordinates.

Results

A total of 13 sites were sampled in the Middle Fork Boise River basin in 2004 (Appendix A Table 1and 2, Figures 1-3). Eleven sites had multiple-pass 50%depletion estimates calculated and habitat data collected. Three species of fish were captured. There were 338 individuals captured including 14 bull trout ranging from 105 mm to 210 mm total length (Table 1). Eighty-two tailed frogs of various life stages were also captured.

Table 1. Total fish captured during 2004 electrofishing sampling.

Middle Fork Boise River Fish Summary

Species	Number Captured 2004
Bull Trout (*Salvelinus confluentus*)	14
Rainbow trout (*Oncorhynchus mykiss*)	189
Sculpin sp. (*Cottus sp*.)	135
Total	338

Bull trout were found in 3 of the 13 sites sampled. Bull trout were only present in Black Warrior Creek (Figure 2). Rainbow trout were the only trout species present in Eagle Creek and the lowest elevation Bald Mountain Creek site. Neither fish nor amphibian species were found in one site on Bald Mountain Creek. Bull trout were present less than 1 mile downstream from this site during surveys in 2003 after the Hot Creek fire. A fish passage barrier was discovered on Bald Mountain Creek less than 0.5 miles from its mouth (Figure 3). Only tailed frogs were found at the two highest elevation sites on Bald Mountain Creek.

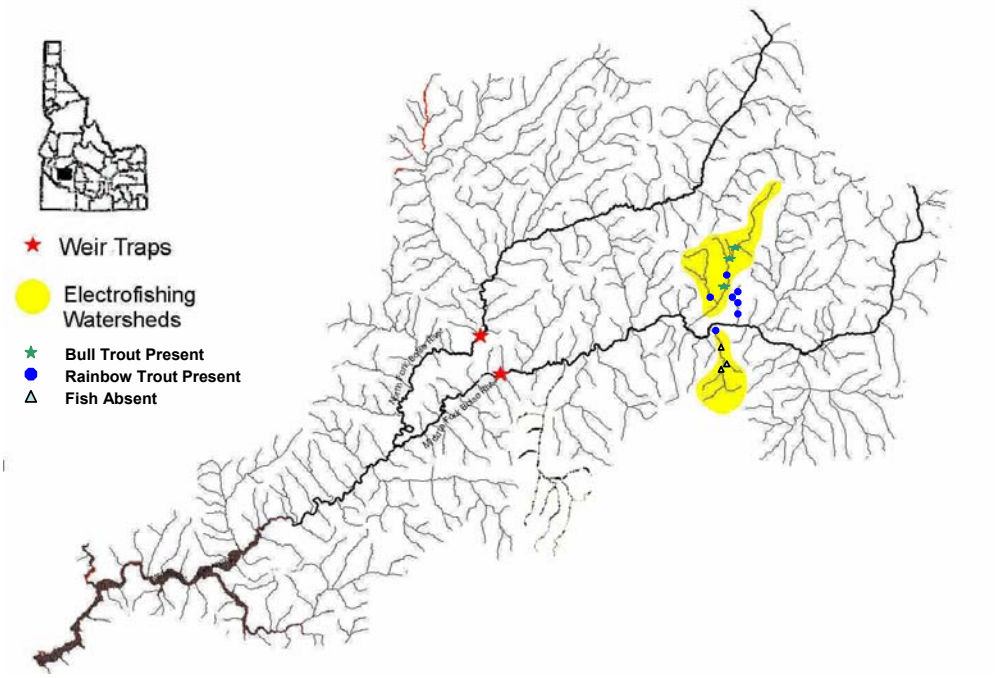

Figure 2. Trout species sampled on the Middle Fork Boise River in 2004. ▲ = no fish (● = rainbow Trout, ✱ = bull trout).

Deleted: ¶

Figure 3. Debris jam and water fall on Bald Mountain Creek in the Boise River Basin (1 inch = ~ 3 feet).

Two pass depletion estimates were calculated for 11 sites sampled during the three years. Table 2 shows the number of sites sampled, number of fish captured, and the number of sites in which each species was captured (bull trout, sculpin spp. and rainbow trout).

Table 2. Fish capture for 11 sites sampled with multiple-pass depletion methods in 2004.

Species	Number Captured	Number of Sites With Species Present
Bull trout *(Salvelinus confluentus)*	14	3
Rainbow trout (*Oncorhynchus mykiss*)	183	9
Sculpin (*Cottus sp.)*	135	4

Discussion

In mid-July 2003, lightning caused a small fire near Hot Creek, a tributary to the Middle Fork Boise River. The fire rapidly spread out of control burning thousands of acres in the upper Middle Fork watershed. A strong thunderstorm in August caused major scouring and debris flows in the badly burned watersheds. A few weeks after this event fish surveys were completed in Bald Mountain Creek. Although this drainage was severely burned in the fire large debris flows did not occur after the rainstorm. Fish species were present at ~5000 feet elevation, 0.5 miles upstream from the mouth (8 bull trout, 20 rainbow trout, and 15 tailed frogs. In 2004 no fish were present from 1.0 mile upstream from mouth of Bald Mountain Creek to the headwaters, only tailed frogs were found in these upper elevation sites. Fish were found below a debris jam 0.5 miles from the mouth of the creek (five rainbow trout, two tailed frogs) (Figure 3). Thunderstorms in late June 2004 caused major debris flows in Lake, Steel and Bald Mountain Creeks. Future surveys should continue to monitor fish presence and habitat conditions in areas affected by recent wildfires.

Portions of the Black Warrior Creek watershed burned in fires in 2000 and 2003. A mining claim allows access by ATV's along Black Warrior Creek from the mouth to headwater habitats. Forest Service Trail 053 runs along all of Black Warrior Creek crossing the stream many times. After the 2000 and 2003 fires, flooding and debris jams raised the creek water and bed level in sections of the first two stream miles then transferred the river channel to the trail. ATV's now are driven up the creek bed for long stretches of the first six miles of the trail. Fish survey teams found detrimental effects on the riparian vegetation in many sections of Black Warrior Creek due to motorized vehicle access. Grid fines were also very high in this creek. Although bull trout are still present in headwater areas (upper four miles without ATV access), the lower reaches of Black Warrior Creek may deter migratory bull trout from moving into headwater areas from the Middle Fork Boise River. One radio tagged adfluvial bull trout was found in headwater areas of Black Warrior Creek in 2003. In 2003 and 2004 several radio-tagged adult bull trout remained in the Middle Fork instead of entering spawning habitat even during turbid conditions after major debris flows. Conditions in Black Warrior Creek could be affecting access to Black Warrior Creek for these fish.

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APPENDIX A

Table 1. Sites sampled, UTM coordinates and electrofishing methods for 2004.

Site	Creek	UTM Zone	UTM E	UTM N	Method	Length
EAGL1	Eagle Creek.	11T	641913	4854915	Multiple-pass depletion	100 m
EAGL2	Eagle Creek.	11T	642030	4855421	Multiple-pass depletion	100 m
EAGL3	Eagle Creek.	11T	642227	4855896	Multiple-pass depletion	100 m
EAGL4	Eagle Creek.	11T	641910	4855916	Presence/absence spot checks	12.4 m
BALD 0	Bald Mountain Creek	11T	639770	4853148	2-pass presence/absence	100 m
BALD 1	Bald Mountain Creek	11T	640629	4854953	1-pass presence/absence	100 m
BALD 4	Bald Mountain Creek	11T	641244	4849888	Multiple-pass depletion	100 m
BALD 7	Bald Mountain Creek	11T	640955	4849847	Multiple-pass depletion	100 m
BW 1	Black Warrior Creek	11T	640338	4852336	Multiple-pass depletion	100 m
BW 2	Black Warrior Creek	11T	640942	4858766	Multiple-pass depletion	100 m
BW 3	Black Warrior Creek	11T	641137	4859907	Multiple-pass depletion	100 m
BW 4	Black Warrior Creek	11T	641762	4861243	2-pass presence/absence	100 m
WW 1	West Warrior Creek	11T	639964	4855876	Multiple-pass depletion	100 m

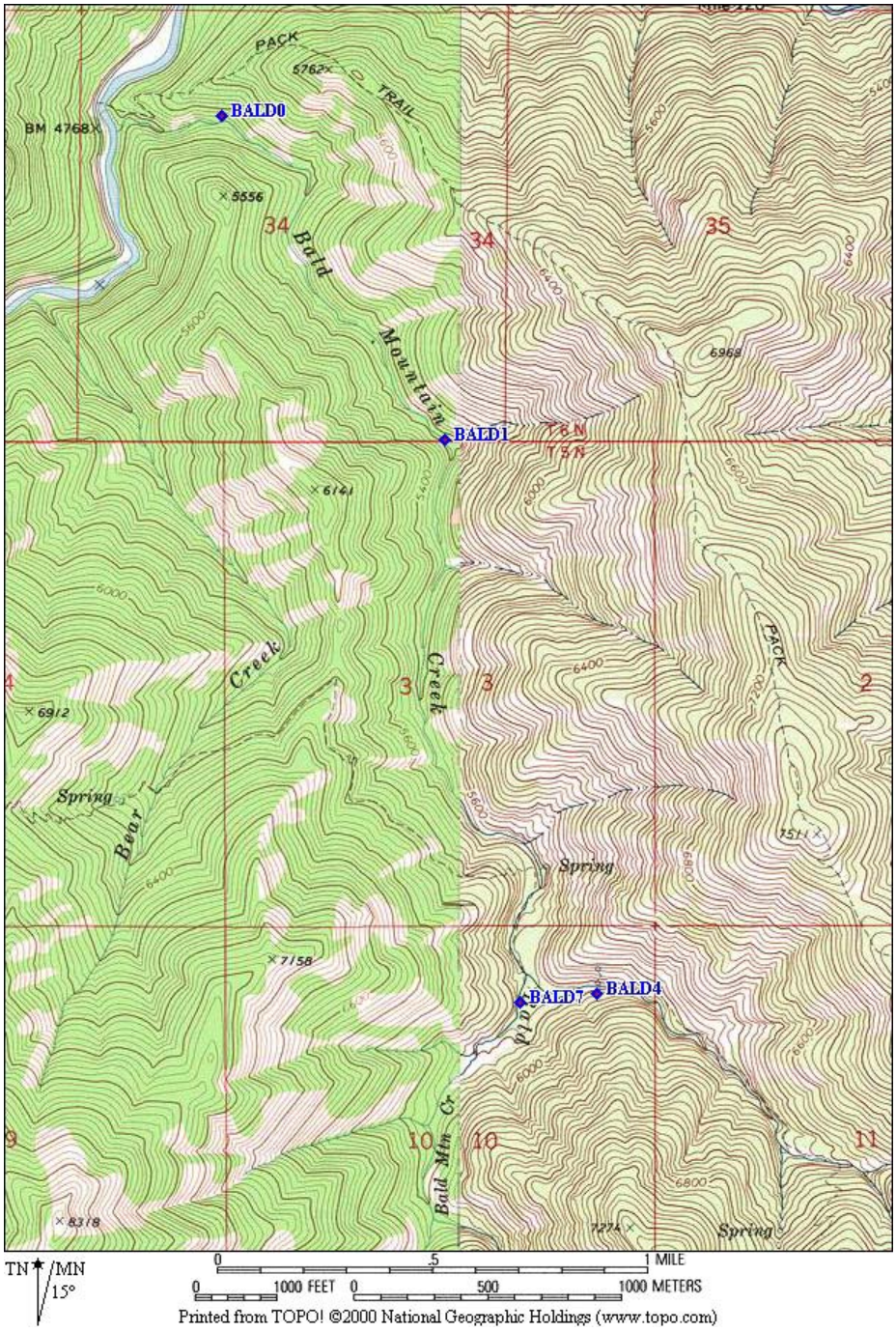

Figure 1. Sites sampled on Bald Mountain Creek with electrofishing in 2004.

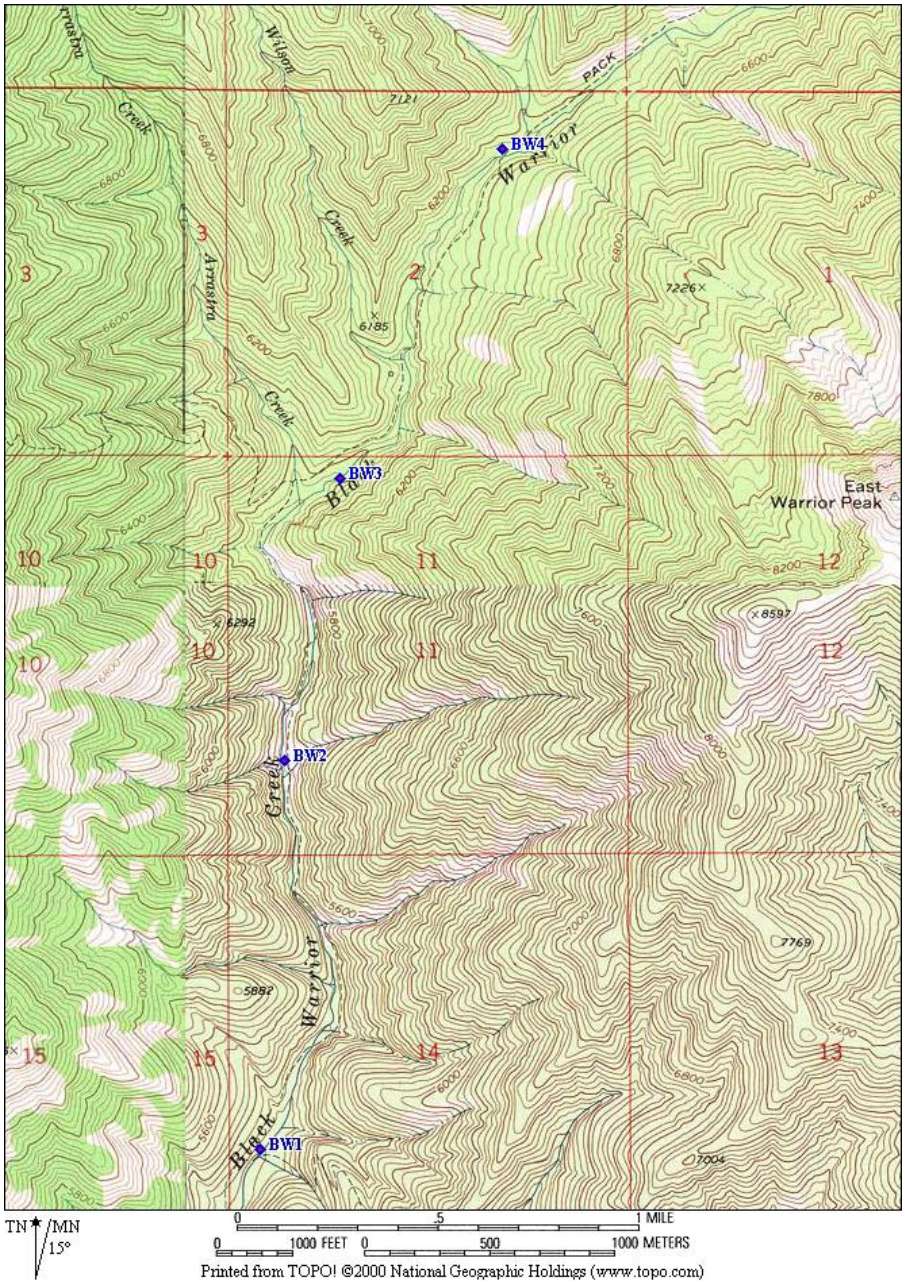

Figure 2. Sites sampled on Black Warrior Creek with electrofishing in 2004.

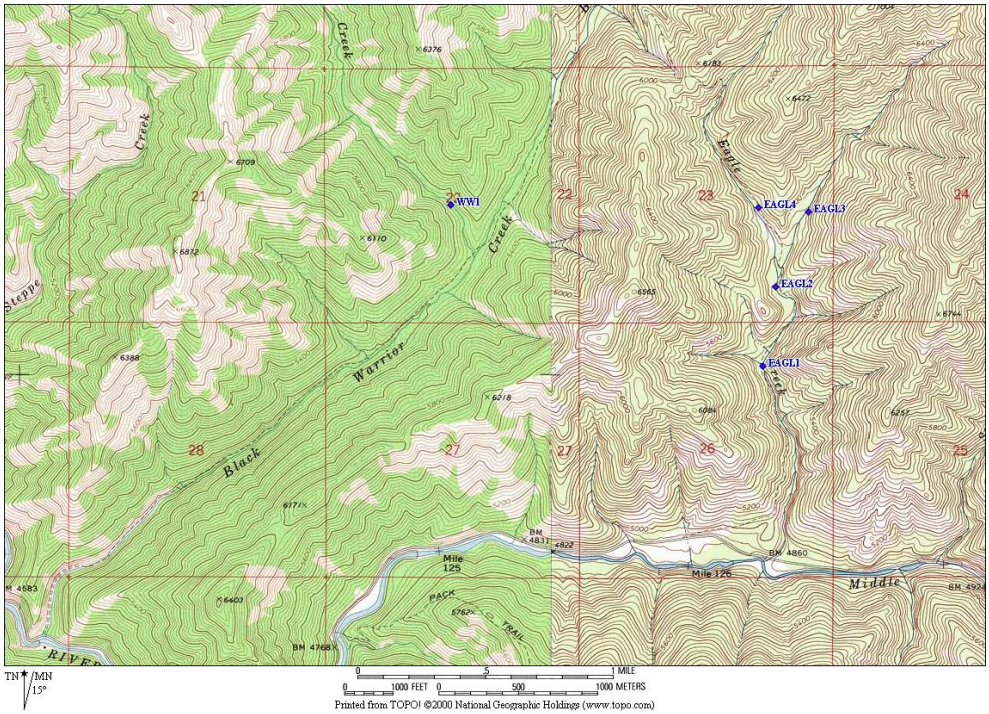

Figure 3. Sites sampled on West Warrior and Eagle Creeks with electrofishing in 2004.

Table 2. Fish catch by species and site for 2004 electrofishing streams.

	Stream Electrofishing Sites													
Species	Bald MTN 0.5	Bald MTN 1.0	Bald MTN 4.0	Bald MTN 7.0	Black Warrior 1	Black Warrior 2	Black Warrior 3	Black Warrior 4	Eagle 1	Eagle 2	Eagle 3	Eagle 4	West Warrior 1	**Total Catch**
Bull trout (BT) (Salvelinus confluentus)	0	0	0	0	1	0	2	11	0	0	0	0	0	14
Rainbow trout (RB) (Oncorhynchus mykiss)	5	0	0	0	12	17	13	18	47	45	17	6	9	189
Sculpin spp. (SC) (Cottus spp.)	0	0	0	0	9	58	19	0	0	0	0	0	49	135
Total Fish	5	0	0	0	22	75	34	29	47	45	17	6	58	338
Amphibians (tailed frogs or tadpoles)	2	0	3	2	7	2	7	11	11	14	4	0	19	82